

PATENT APPLICATION  
OF  
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FOR  
RAPID ATTACHMENT BUCKLE

## CROSS REFERENCE TO RELATED APPLICATIONS

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## BACKGROUND DISCUSSION

### 1. Field of the Invention

This invention relates to buckles used in combination with flexible web straps in a myriad  
10 of applications, a typical example being the attachment of rucksacks to load bearing frames.

### 2. Description of the Prior Art

With reference initially to Figure 14, rucksacks 10 and the like are typically attached to  
external load bearing frames 12 with a web strap and bail arrangement generally indicated at 14.  
15 A bail 16 is sewn as at 18 to the ruck 10 by means of a short length 20 of web along with a longer  
length 22 of web. The short web length 20 is hooked around one rib 16a of the bail to provide the  
permanent attachment of the bail to the rucksack. The longer strap length 22 is hooked around  
the frame 12 and then threaded back beneath the bail, around ribs 16b and 16c before finally  
being passed back over the bail and inserted beneath rib 16d. It goes without saying that the  
20 threading of web 22 over and around multiple bail ribs is tedious, complex and time consuming.

When the frame 12 is used without the rucksack attached, for example, when carrying  
oversized or oddly shaped loads, easily and quickly detaching the rucksack from the frame  
becomes a consideration. At worst, it is impossible to accomplish while wearing heavy gloves or  
mittens. Further complications arise when the attachment web 22 is pulled tightly across the bail  
25 by heavily loading the rucksack. Under these conditions, it often becomes necessary to pry the  
web 22 with a levering tool of some kind (not shown) in order to loosen it sufficiently so that it  
can be unthreaded from the bail.

The objective of the present invention is to provide a buckle to which a flexible web strap can be readily and securely attached without laborious and time consuming threading, and from which the strap can be quickly and easily detached.

5    SUMMARY OF THE INVENTION

The buckle of the present invention is designed for use with a flexible web strap having a substantially uniform width and thickness, with an end tab of increased thickness. The buckle is formed with a base and parallel side walls cooperating with the base to define an open-ended receiving channel having entry and exit ends. Flanges are spaced vertically from the base and  
10    extend inwardly in cantilever fashion from the side walls to define an open-ended slot communicating with and extending along the length of the receiving channel. The slot is configured and dimensioned to accommodate longitudinal pinching and lateral insertion of the strap into the receiving channel, and the receiving channel is configured and dimensioned to receive the thickened end tab via its entry end. The undersides of the cantilevered flanges are  
15    configured to securely wedge the thickened end tab in the receiving channel and to prevent its longitudinal withdrawal via the channel's exit end. The web strap is readily separable from the buckle by first pulling it longitudinally towards the entry end, and then simply pulling it laterally from the receiving channel through the open-ended slot.

These and other features of the buckle of the present invention will now be described in  
20    greater detail with reference to the accompanying drawings, wherein:

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of one embodiment of a buckle in accordance with the present invention, the buckle being shown in use attaching a rucksack or the like to a load bearing frame;

5        Figure 2 is a perspective view of the buckle of Figure 1;

Figure 3 is a sectional view taken along line 3-3 of Figure 2;

Figure 4 is an end view of the buckle taken from the entry end;

Figure 5 is a perspective end view of the buckle also taken from the entry end;

Figure 6 and 7 are perspective views similar to Figure 1 showing the associated web at  
10        various stages during its interconnection with the buckle;

Figure 8 is a sectional view on an enlarged scale taken along line 8-8 of Figure 1;

Figure 9 is a perspective view of a second embodiment of a buckle in accordance with the present invention;

Figure 10 is a longitudinal sectional view on an enlarged scale taken through line 10-10 of  
15        Figure 9, and showing the buckle threaded onto a web;

Figure 11 is a sectional view through a thickened end tab of the web shown in Figure 10;

Figure 12 is a sectional view similar to Figure 10 and showing the end tab received and releasably locked within the buckle;

Figure 13 is a perspective view of a third embodiment of a buckle of the present invention,  
20        the buckle being formed as an integral feature of a support frame or the like; and

Figure 14 is a sectional view through a prior art web strap and bail arrangement.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

With reference initially to Figure 1, a portion of a rucksack 24 or the like is shown attached to a support frame 26 by means of a flexible strap 28 coacting with a buckle 30 in accordance with one embodiment of the present invention. For reasons that will hereinafter  
5 become apparent, the strap 28 is provided with a thickened end tab 28' made up of multiple folds stitched together as at 29. With reference additionally to Figures 2-5, it will be seen that the buckle 30 comprises a base 32 cooperating with parallel upstanding side walls 34 to define an open-ended receiving channel 36 having entry and exit ends 36a, 36b. Flanges 38 are spaced vertically from the base 32 and extend inwardly in cantilever fashion from the side walls 34 to  
10 define an open-ended slot 40 extending along the length of the channel 36.

As can best be seen in Figure 2, the flanges 38 have converging sections leading from a maximum width  $W_m$  of the slot 40 at the entry end 36a of channel 36 to a reduced slot width  $W_r$  at an intermediate location along the channel length. The undersides of the flanges 38 are configured to provide jam surfaces 42 sloping downwardly to horizontal lands 44 which in turn  
15 lead to stepped stop surfaces 46.

As can best be seen in Figure 8, the buckle 30 is seated on a lower run 28a of strap 28, and is held in place by an attachment web 48 extending over the base 32. Both the attachment web 48 and the lower strap run 28a are stitched as at 50 to the ruck sack 24.

Referring now to Figure 6, it will be seen that in order to attach the ruck sack 24 to the  
20 support frame 26, the strap 28 is initially wrapped around the frame, with its upper run 28b overlying the buckle 30, and with the thickened end tab 28' of the strap located on the entry side of the buckle's receiving channel 36. The upper strap run 28b may then be pinched laterally as shown at 28c to a reduced width slightly less than the width  $W_r$  of slot 40 to accommodate its

lateral insertion into the receiving channel 36. The widened section  $W_m$  of slot 40 eases this task by guiding the strap to the required minimum width.

Once the upper strap run 28b is laterally inserted into the buckle channel 36, and as shown in Figure 7, the upper strap run is simply pulled in the direction depicted by arrow 52, thereby pulling the thickened end tab 28' into the receiving channel 36 via its entry end 36a. As the thickened end tab 28' enters the channel 36, it is pinched and frictionally held between the overlying jam surfaces 42 and the underlying attachment web 48 extending over the base 32. Further entry of tab 28' into the channel 36 is blocked by its engagement with the stop surfaces 46, thus preventing the end tab from being extracted longitudinally from the channel 36 via its exit end 36b. With this arrangement, any loading that increases the tension in strap 28 will only serve to seat the end tab 28' more firmly in the buckle 30.

As shown in Figure 1, the strap may be released from the buckle by first pulling the end tab 28' towards the entry end 36a and then simply pulling the end tab upwardly as indicated by arrow 54. The converging edges of slot 40 will serve to laterally pinch the upper strap run 28b, thereby facilitating its lateral removal, even when under tension.

An alternative embodiment of a buckle in accordance with the present invention is shown at 30' in Figures 9, 10 and 12. The same reference numerals have been employed to identify the features of buckle 30' that are common to those of buckle 30. Buckle 30' differs from buckle 30 in that its base 32 is interrupted by transverse slots 56. Buckle 30' is designed for mounting on a length of strap, an example being the strap 58 threaded through the slots 56 as shown in Figure 10.

To keep the buckle from slipping along the web strap, friction enhancements can be added, an example being, the teeth shown at 60 in Figure 10. As loading is increased, the web strap 58 is pulled proportionately tighter against the teeth 60, thus counteracting any tendency of

the buckle to slip along the strap length. In order to adjust the location of the buckle 30' along the strap length 58, one need only remove the tension loading on the strap, after which lengths of strap can be pulled from either direction through the outer-most slots 56 to create adjustment slack (the loop shown in dotted in Figure 10). Stripping the strap from either end then takes up  
5 the slack loop, allowing the buckle to shift along the strap length.

Again as shown in Figure 10, the path of the web strap over point "X" at the exit end and under point "Y" at the entry end forces the buckle to rotate in a clockwise direction when the web strap 58 is under load. The extent of rotation depends on the position of the outermost slots 56 and the relative vertical positions of points X and Y. A useful angle  $\alpha$  of rotation is between 1° to  
10 30°, and preferably between 5°-25°.

Figure 11 illustrates an end tab 58' particularly suited for use with the buckle 30'. End tab 58' has inverted folds that display a nose 58'' situated above the plane of the web strap.

Figure 12 shows the buckle 30' in interlocked engagement with the end tab 58' of web strap 58. With the buckle rotated as shown in Figure 10, a balance is achieved between the forces  
15 exerted against the jamming and stop surfaces 42, 46 provided on the undersides of the flanges 38, and an additional jamming surface 62 formed by the web strap extending through the center slot 56. Since jamming surface 62 is located below the plane of force (the balance point of the entrance and exit strap sections), and surfaces 42, 46 are above that plane, the buckle remains stable under load with no tendency to rotate.

20 An important contributor to balanced loading between surfaces 42, 46 and jamming surface 62 is the inversion of the folds of end tab 58' so that the lower fold bears directly against jamming surface 62. This insures that a sufficient proportion of the load is transferred from the flanges 38 to the base 32 of the buckle where the buckle structure is more robust and less likely to distort under load.

As shown in Figure 11, the end tab length "L" can be adjusted to seat into the pocket formed by jamming surface 62 and a retention surface 64 (see Figure 12). This will provide resistance to forces tending to pull the end tab 58 back out through the entry end 36a of the buckle channel.

5        With reference to Figure 13, a third embodiment of a buckle in accordance with the present invention as shown at 30'. The buckle 30' is formed as an integral part of a frame structure 66, with an internal configuration and resulting functions and advantages essentially identical to those discussed above with reference to buckles 30 and 30'.

I claim: